


6.00 credits	45.0 h + 30.0 h	Q1
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Teacher(s)	Renaud François (compensates Vitale Enrico) ; Vitale Enrico ;
Language :	French
Place of the course	Mons
Prerequisites	The mathematical background from a program of at least 4h mathematics in final year of school (upgrading, "Coup de pouce", given in the beginning of the year).
Main themes	<p>Ce cours comporte deux parties :</p> <p>A. Analyse des fonctions réelles (30h + 20h)</p> <ul style="list-style-type: none"> <li>• Fonctions réelles;</li> <li>• Limite et continuité;</li> <li>• Calcul infinitésimal, en particulier : (i) calcul différentiel pour fonctions réelles d'une seule variable réelle; (ii) Polynômes de Taylor</li> <li>• Introduction au calcul intégral pour fonctions réelles d'une seule variable réelle;</li> </ul> <p>B. Algèbre linéaire (15h Théorie) + 10h Exercices)</p> <ul style="list-style-type: none"> <li>• Systèmes d'équations linéaires;</li> <li>• Méthode de l'élimination de Gauss-Jordan;</li> <li>• Vecteurs, espaces vectoriels, indépendance linéaire, bases;</li> <li>• Matrices, algèbre matricielle, déterminants, inversion de matrices, indépendance linéaire et rang d'une matrice, valeurs propres et vecteurs propres</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>1 This course must enable students to understand the mathematics encountered in economics and management, and afterwards, to acquire the capacity to manipulate the notions studied to solve problems by themselves.</p>
Evaluation methods	<p>The final grade is the sum of two marks: T = the SMART week test gives a bonus between 0 and 2 points; E = Examination in session gives a score between 0 and 20 points. The final grade is T + E (if it exceeds 20 points, it is reduced to 20). If you have to represent the exam in June or September, the bonus points T remain acquired.</p> <p>To avoid wasting time in the dilemma of whether or not to represent the exam in June or September if a mark of less than 10 was obtained in January, it is understood that the note that will be sent in June or September will be the maximum between the marks obtained at the different sessions.</p> <p>The test: Duration 1 hour. Calculator and gsm prohibited. The test consists of one or two exercise-type questions. The correction will be made in audience right after the end of the test.</p> <p>Examination: closed book written exam lasting between 2 and 3 hours. Calculator and mobile phone prohibited. The exam consists of two or three questions including exercise-type questions and reflection questions. The answer key will be available on the Student Corner after the end of the session and before the copy consultation session.</p> <p>This is the procedure in case of a face-to-face examination. If, due to force majeure, the exam must be done remotely, it will be an open book written exam (the documents available for consultation are only those listed in the "teaching material" section). In case of difficulty in interpreting the exam copy, the teacher may question the student orally starting from the copy.</p>

Teaching methods	<p>The lecture aims to introduce the theory from simple problems and to illustrate it by exercises solved in audience. The lecture, online syllabus, note taking and personal elaboration should help you strengthen your analysis and synthesis skills.</p> <p>The TP sessions should allow you to appropriate the tools introduced in the lecture by exercises of different levels (calculation, reflection, synthesis, context, etcetera). TP sessions are also an opportunity to learn how to properly write a mathematical statement or exercise.</p> <p>Both during the lecture and in the TP session, your questions are always welcome. After each supervised activity (lecture or session TP) an autonomous work of revision is necessary to be able to profit fully from the following activity.</p> <p>Much of the subject matter covers the material seen in high school (particularly with regard to the study of the functions of a real variable). The basic objective is to go through the subject by identifying the essential results and techniques. The second objective is to deepen the subject by highlighting the links between the different parts, by digging the more delicate points, by questioning the reasons that motivate the theory and finally by refining the rigour and flexibility with which the studied tools and concepts are manipulated. In the linear algebra part, which goes far beyond high school achievement, your ability to abstract thinking will be solicited and strengthened.</p>
Content	<p>In this course, two major mathematical themes are addressed: the study of the functions of a real variable (elements of infinitesimal calculus and integral calculus) and the study of systems of linear equations (elements of matrix calculus and introduction to linear algebra). These themes are approached with a view to their use in economics and management sciences.</p> <p>Contents</p> <ol style="list-style-type: none"> <li>1. Operations on fractions. General information on functions. Lines, parabolas and polynomials. Rational functions, powers and roots. Exponential function and logarithm function. Trigonometric and inverse trigonometric functions. Operations on functions.</li> <li>2. Continuity. Fundamental theorems on continuity. Limits to infinity and at a point. Asymptotes. Definition and properties of the derivative. Fundamental theorems on derivatives. Growth, decrease and optimization of a function. Taylor polynomial.</li> <li>3. Definition and geometric interpretation of the Riemann integral. Fundamental theorem of integral calculus. Calculation of the primitives. Improper integrals.</li> <li>4. Linear systems, operations on matrices, rank and Gaussian method. Determinant and invertible matrices. Eigenvalues and eigenvectors, diagonalization.</li> <li>5. Real vector spaces and subspaces, linear combinations, bases and dimension.</li> </ol>
Inline resources	<p>The syllabus (still in the finalization phase), the exercises with solution for TP sessions and the old exam questions with detailed correction are available on the Student Corner website. The solutions for the exercises of the TP might become available only after the TP session.</p>
Other infos	<p>Attention: the schedule does not happen again the same week by week. It is therefore necessary to regularly consult the Student Corner for more details.</p> <p>Beyond the prior knowledge, what matters above all is the motivation to learn and understand and the goodwill to accomplish the necessary independent work.</p> <p>This teaching has two objectives:</p> <ul style="list-style-type: none"> <li>- Allow you to be comfortable with the basic mathematical tools that will intervene in the rest of your course at the university (whether in management sciences or management engineering).</li> <li>- Help you develop your capacity for analysis and synthesis.</li> </ul>
Faculty or entity in charge	CLSM

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Management	<a href="#">GESM1BA</a>	6		
Bachelor : Business Engineering	<a href="#">INGM1BA</a>	6		